REMARKS

Claim Rejections - 35 U.S.C. § 103

The Examiner has rejected claims 1-2, 4-5, 36-38 and 40 under 35 U.S.C. §103(a) as being unpatentable over Sandhu (U.S. Patent No. 6,084,302), hereinafter "*Sandhu*" in view of Funkenbusch et al. (U.S. Patent No. 5,108,597), hereinafter "*Funkenbusch.*"

The Examiner has rejected claims 30-35 under 35 U.S.C. §103(a) as being unpatentable over Noorily (U.S. Patent No. 4,616,102), hereinafter "*Noorily*" in view of *Funkenbusch.*

The Examiner has rejected claims 3, 6-7, *39,* and 41 under 35 U.S.C. §103(a) as being unpatentable over *Sandhu* in view of *Funkenbusch* as applied to claims 1-2, 4-5, and 8 above, and further in view of *Noorily.*

Claims 1-2, 4-5, 36-38 and 40

The Examiner has rejected claims 1-2, 4-5, 36-38 and 40 under 35 U.S.C. §103(a) as being unpatentable over *Sandhu* in view of *Funkenbusch.* In support of the § 103(a) rejections of claims 1-2, 4-5, 36-38 and 40, the Examiner states that "**Funkenbusch et al. teaches a carbon cladding having a carbon concentration greater than 60% by weight, see column 2, line 18 though column 3, line 14**" and additionally that "It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a teaching of Funkenbusch et al. employed in the PCB of Sandhu in order to provide an excellent shield and a high level resistance in the PCB." Applicant respectfully disagrees with the combination

proposed by the Examiner for three specific reasons discussed in detail beginning at the top of page 10 of the present response. The preceding pages 8-9 include a brief discussion of the invention as claimed by Applicant in claims 1-2, 4-5, 36-38 and 40, and the prior art references applied by the Examiner.

Applicant teaches and claims in claims 1-2, 4-5, 36-38 and 40 carbon-based **cladding having a carbon concentration greater than 60% by weight** that enshrouds either: an elongated electrically conductive member (independent claim 1) or a signal line (independent claim 36). The carbon-based cladding attenuates the field components about the conductive member or signal line to reduce interaction between the field components and surrounding conductive members or signal lines. This allows for the additional benefit of greater circuit densities to be achieved as well as the transmission of higher frequencies along the conductive members or signal lines.

It is Applicant's understanding that *Sandhu* discloses a method for fabricating an integrated circuit interconnect upon a semiconductor substrate to prevent copper diffusion. In this method a copper interconnect is formed. Next, a metal is embedded or inserted into the copper interconnect (for example by ion implantation) to provide an introduced metal, such as titanium, tantalum, tungsten, chromium, and aluminum. A gas is reacted with the introduced metal during a plasma process at 400 °C to 800 °C to form a barrier layer cladding upon the copper interconnect. Substantially all of the introduced metal diffuses to the surface of the copper interconnect during the plasma process and reacts with the gas. The thickness of the barrier cladding layer is preferably between 100 angstroms and 500 angstroms. Furthermore, *Sandhu* explains that the "nitrides, oxides, and **carbides do not form on interlevel dielectric oxide** 10." (col. 5, lines 20-21). Thus, the **carbide**

cladding of *Sandhu* consists of the implanted metal and carbon, and **is only formed in the surface of the metal interconnects.**

It is Applicant's understanding that *Funkenbusch* describes the forming of carbon cladding onto the surface of oxide particles, and additionally describes the Background section the formation of a carbon support particle (not carbon-clad).

Foremost, *Funkenbusch* discloses the forming of **carbon-clad oxide particles** that are useful as a chromatographic support material. (*Funkenbusch*, col. 1, lines 5-7; col. 7, lines 6-7). Specifically, *Funkenbusch* describes carbon cladding over the surface of the ZrO2 support particle. (*Funkenbusch*, col. 7, lines 3-6). As explained in *Funkenbusch*, "**The present method is applicable to any inorganic oxide substrate to which carbon will deposit under the operating conditions of the method.**" (*Funkenbusch*, col. 8, lines 12-15, emphasis added). Thus, the **carbon cladding** of *Funkenbush* is **only formed on the surface of an oxide substrate.**

Moreover, *Funkenbusch* additionally describes in the Background section that **carbon particles** (not cladding) have been used as chromatographic support materials. See specifically, the heading "B. Carbon-Based Chromatographic Support Materials." (*Funkenbusch* , col. 2, line 12). As explained in *Funkenbush* at col. 2, line 18 – col. 3, line 14, and more specifically at col. 3, lines 5-10, carbon **particle** supports are "**prepared by** treating hard activated carbon or coke particles with solvents, and then **heating them at 2400 °C – 3000 °C** under an inert gas atmosphere. The resulting support materials are disclosed as having a carbon content of at least 99 percent." Thus, *Funkenbusch* additionally discloses the formation of carbon **particles** for use a chromatographic support material, in which a hard activated carbon or coke particle is heated at 2400 °C – 3000 °C to achieve a high carbon content.

Applicant respectfully disagrees with the combination proposed by the Examiner because:

(1) ***Funkenbusch* does not teach a carbon cladding having a carbon concentration greater than 60% by weight (instead *Funkenbusch* teaches a carbon particle having a carbon concentration greater than 60%)**, and therefore the combination **fails to teach each and every element** of the invention as claimed;

(2) the combination would render *Sandhu* **inoperable for its intended purpose** because *Funkenbusch* requires temperatures in the range of 2400 °C – 3000 °C in order to prepare a carbon particle with a carbon content of 99 percent; and

(3) there would be **no reasonable expectation of success** in the combination because the carbon cladding of *Funkenbusch* is only applicable for inorganic oxide substrates.

(1) *Funkenbush* does not teach a carbon **cladding** having a carbon concentration greater than 60% by weight, and therefore the combination **fails to teach each and every element** of the invention as claimed

The Examiner states that "Funkenbusch et al. teaches a carbon cladding having a carbon concentration greater than 60% by weight, see column 2, line 18 though column 3, line 14." However, contrary to the Examiner's assertion, Applicant respectfully submits that the specific portion of the specification upon which the Examiner relies is describing the formation of a carbon **particles (not cladding)** for use a chromatographic support material. As described above, support for Applicant's understanding is provided in the subheading titled "Carbon-Based Chromatographic Support Materials" (*Funkenbusch* , col. 2, line 12) and additionally where it is described that "The resulting support materials are disclosed as having a carbon content of at least 99 percent" (*Funkenbusch* , col. 3, lines 8-10). Accordingly,

Funkenbusch does not disclose a **carbon cladding layer** having a carbon concentration greater than 60% by weight, instead *Funkenbusch* discloses a **carbon particle** having a carbon concentration greater than 60% by weight.

Therefore, Applicant respectfully submits that the modification of *Sandhu* in view of *Funkenbusch* fails to teach each and every element of the invention as claimed in claims 1-2, 4-5, 36-38 and 40, and Applicant requests withdrawal of the rejections under 35 U.S.C. §103(a).

(2) The combination would render *Sandhu* inoperable for its intended purpose because *Funkenbusch* requires temperatures in the range of 2400 °C – 3000 °C in order to prepare a carbon **content of 99 percent**, and therefore there is no motivation to modify *Sandhu* in view of *Funkenbusch*

The Examiner states that "It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a teaching of Funkenbusch et al. employed in the PCB of Sandhu in order to provide an excellent shield and a high level resistance in the PCB." However, Applicant respectfully submits that the combination would render the device of *Sandhu* inoperable for its intended purpose because *Funkenbusch* requires temperatures in the range of 2400 °C – 3000 °C in order to prepare a carbon particle with a carbon content of 99 percent.

Aguendo, assuming that the teaching of forming a carbon particle with a carbon content of 99 percent of *Funkenbusch* is employed in the integrated circuit interconnect structure *Sandhu* as suggested by the Examiner, the modification would render the device of *Sandhu* inoperable for its intended purpose. *Funkenbusch* requires heating at temperatures of 2400 °C – 3000 °C in order to prepare the carbon particle with a carbon content of 99 percent. It is well known in the art that the copper interconnects (15) of *Sandhu* are incapable of withstanding temperatures in the range of 2400 °C – 3000 °C. In fact *Sandhu* discloses anneal temperatures of 400

°C – 800 °C. Furthermore, copper has a melting temperature of 1083 °C and a boiling temperature of 2562 °C. Utilizing the required heating temperature of 2400 °C – 3000 °C in *Funkenbush*, would not only melt the copper interconnects of *Sandhu*, but would potentially boil them away.

Accordingly, Applicant respectfully submits that employing the teaching of *Funkenbusch* in the process for forming an integrated circuit interconnect structure of *Sandhu* would render *Sandhu* inoperable for its intended purpose. Therefore, Applicant requests withdrawal of the rejection of claims 1-2, 4-5, 36-38 and 40 under 35 U.S.C. §103(a) as being unpatentable over *Sandhu* in view of *Funkenbusch*.

(3) There would be **no reasonable expectation of success** in the combination because the carbon cladding of *Funkenbusch* is only applicable for inorganic oxide substrates

There would be no reasonable expectation of success in employing the method of forming a carbon-cladding of *Funkenbusch* in the integrated circuit interconnect structures of *Sandhu*. As stated multiple times in *Funkenbusch*, the method of depositing a **carbon cladding** in *Funkenbusch* is **applicable to inorganic oxide substrates**. (*Funkenbusch*, col. 8, lines 12-14). To the contrary, the disclosure of *Sandhu* explains that the "nitrides, oxides, and **carbides do not form on interlevel dielectric oxide** 10." (col. 5, lines 20-21). Accordingly, *Funkenbusch* is directed toward a method of depositing a carbon cladding on an oxide, while *Sandhu* expressly does not deposit a carbon cladding on an oxide. Not only does the process of *Funkenbush* not deposit a carbon cladding on a metal layer or metal substrate, the process of *Funkenbush* is selective to oxide substrates.

Accordingly, Applicant respectfully submits that there would be no reasonable expectation of success in employing the teaching of *Funkenbusch* in the process for forming an integrated circuit interconnect structure of *Sandhu*.

Therefore, Applicant requests withdrawal of the rejection of claims 1-2, 4-5, 36-38 and 40 under 35 U.S.C. §103(a) as being unpatentable over *Sandhu* in view of *Funkenbusch.*

Claims 30-35

The Examiner has rejected claims 30-35 under 35 U.S.C. §103(a) as being unpatentable over *Noorily* in view of *Funkenbusch.* The Examiner states that "Noorily does not specific disclose the cladding have a carbon concentration greater than 60% or 99% by weight" and that "It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a teaching of Funkenbusch et al. employed in the PCB of Noorily in order to provide an excellent shield and a high level resistance in the PCB."

Applicant claims in claims 30-35 a **rigid dielectric board** member having a plurality of conductor elements and a carbon-based cover having a **carbon concentration higher than 60 percent** that fully covers the top, bottom and side portions of at least one of the conductor elements.

It is Applicant's understanding that *Noorily* describes a **flexible electric cable** assembly for use with undercarpet wiring systems with electric conductors contained within a casing made from a laminate of polyester and polyvinylchloride. (*Noorily,* col. 3, lines 20-25). Specifically, *Noorily* describes "the invention of a flexible electric cable assembly 10" having "a flexible multiconductor cable 12, an electrically insulative film 14 . . ., an electrically conductive, self-sustaining, flexible member 16 . . ., an electrically conductive, self-sustaining, flexible shield 18 . . . and a flexible shield 20, preferably comprising two plastic films. (*Noorily,* col. 3, lines 6-14).

Therefore, *Noorily* fails to describe a carbon-based cover having a **carbon concentration higher than 60 percent** by weight, a **dielectric board** member, and for that matter a **rigid dielectric board** member.

Funkenbusch, as discussed above, also fails to disclose a carbon-based cover having a **carbon concentration higher than 60 percent** by weight, a **dielectric board** member, and for that matter a **rigid dielectric board** member.

Therefore, Applicant respectfully submits that the combination of *Noorily* with *Funkenbusch* fails to disclose each and every element of the invention as claimed in claims 30-35 and respectfully requests withdrawal of the rejections under 35 U.S.C. § 103(a) over the combination.

In addition, Applicant respectfully submits that one skilled in the art of implementing transmission structures on printed circuit boards would not be motivated to combine the teachings of a reference describing a flexible flat conductor electrical cable assembly, *Noorily*, with a method for forming chromatographic support material, *Funkenbusch*.

Furthermore, the problem solved in *Noorily* is also completely different from the problem solved by *Funkenbusch*. The *Noorily* reference describes overcoming problems related to use of flexible, thin profile cable assembly, such as heat dissipation, electrical transfer capability and enhanced accommodation of piercing by sharp objects. (*Noorily*, col. 2, ll. 5-10). Conversely, *Funkenbusch* describes overcoming problems of composite support materials useful in liquid stage chromatography to provide "very high physical and chemical stability in aqueous media of high pH." (*Funkenbusch*, col. 6, ll. 5-29). Thus, an ordinary person skilled in the art of solving a problem dealing with flexible, flat conductor electrical cable assemblies would have no motivation to look to the art of liquid chromatography support materials.

Because of the differences between the art of cables and that of liquid chromatography support materials, one skilled in the art of cables would not be motivated to combine the reference of *Noorily* with that of *Funkenbusch*. Furthermore, neither *Noorily* nor *Funkenbusch* provide motivation to combine cable technology with that of liquid chromatography support materials. Thus, the motivation can only be gleaned from impermissible hindsight.

Therefore, Applicant requests withdrawal of the rejection of claims 30-35 under 35 U.S.C. §103(a) as being unpatentable over *Noorily* in view of *Funkenbusch*.

Claims 3, 6-7, 39, and 41

The Examiner has rejected claims 3, 6-7, 39, and 41 under 35 U.S.C. §103(a) as being unpatentable over *Sandhu* in view of *Funkenbusch* as applied to claims 1-2, 4-5, and 8 above, and further in view of *Noorily*.

In view of the above comments, Applicant submits that claims 3, 6-7, 39, and 41 are allowable for at least the reasons discussed above for independent claims 1 and 36. Furthermore, Applicant urges there is no motivation to combine *Noorily* with *Funkenbusch* and *Sandhu* for at least the reasons provided above with respect to claims 30-35.

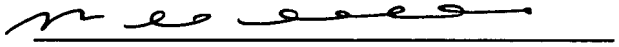
Accordingly, Applicant respectfully requests withdrawal of the rejections of claims 3, 6-7, 39, and 41 under 35 U.S.C. § 103(a), over *Sandhu* in view of *Funkenbusch* as applied to claims 1-2, 4-5, and 8 above, and further in view of *Noorily*.

Pursuant to 37 C.F.R. 1.136(a)(3), applicant(s) hereby request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. 1.16 and 1.17, to Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

Date: November 14, 2007



Michael A. Bernadicou
Reg. No. 35,934

1279 Oakmead Parkway
Sunnyvale, CA 94085-4040
(408) 720-8300